ITS Technology Applications for Work Zones

This list represents the top rated ideas for applying ITS type applications to improve safety in workzones based on the recommendations of the ITS Work Zone Safety Task Force

NEW IDEAS

Unilight

Unilight traffic signals use one lens in one housing versus the standard three-section incandescent signal. Unilights combine light emitting diodes (LEDs) with internationally recognized geometric shapes. A single Unilight signal displays a Green Ball for GO, a Yellow Triangle for Caution and a Red Octagon with a White border for Stop. They are portable, battery powered and controlled remotely by a person standing to the side. For use in construction zones.

Cost Estimate: The Unilight itself is very inexpensive, only a few hundred dollars. Setting up a test deployment at a work zone would probably cost upwards of $5k - $10k which would include where and how to use it and supportive signing, training, etc.

Issues: Does no meet MUTCD rules for signal display. Drivers may be confused by this new display format. Under what situations this system could be used would need to be determined.

Application: Could be used to supplement flagger traffic control at a work site. Most applicable to jobs that will be in one location to justify the set up and take down of a Unilight installation.

Smart Work Zone

Smart Work Zone is an innovative application of video, signing and traffic technologies that provide a portable traffic management system to help make travel through roadway construction and maintenance safer and more efficient. It is a highly adaptable system that has been tested in several states to date.

Cost Estimate: Cost for this can cover a huge range depending on what the system is expected to do: $25k - $250k+.

Issues: A smart work zone system could be used as part of a large construction contract and paid for as part of the contract's traffic control. The system could then either be handed over to the DOT or only used for that contract. If a system is purchased for DOT use issues such as who has control and responsibility for it will need to be decided.

Application. Any project with projected heavy traffic and long enough duration to justify the installation of the system. Large, complex projects impacting heavy traffic for a long period will probably gain the most from these systems.

Construction Zone Safety System

IRD's Construction Zone Safety System uses a series of portable signs, flashing beacons, and SmartSonic sensors to create a dynamic "No Passing Zone" that expands or shortens according to traffic conditions. The SmartSonic sensor is used to detect traffic volumes and speeds for each zone of traffic. The sensor relays a signal to the flashing beacon controller at the next upstream sign to turn on or off accordingly. The static sign becomes enforceable when the beacons flash, such as "NO PASSING WHEN LIGHTS FLASHING". As traffic volume decreases, the "No Passing Zone" decreases and as traffic volume increases, the "No Passing Zone" increases.

Cost Estimate: There could be some considerable cost variation for this type of system

depending on the size of the deployment: $25k - $100k.

Issues: Will need to work with the WSP so that they understand and accept variable en-forcement times.

Application. Ideally suited for rural projects on 2 lane roads where passing presents a hazard.

Speed Violation and Deterrent System (SVDD)

Transformation Systems offers a Speed Violation Detection and Deterrent System (SVDD) for construction work zone safety. The SVDD system has special emphasis on accuracy of license plate recognition and accurate automatic capture of vehicle images. The license plate number of a vehicle
is then displayed on a Variable Message Sign (VMS) along the side of the road with the actual speed recorded for that vehicle so the driver can see it. The system measures average speed of a vehicle over a distance, not a spot speed. This is considered a more accurate measure of driver behavior.

Cost Estimate: For a simple installation including two detection cameras, a VMS and control equipment, $50k.

Issues: There may be privacy issues surrounding this type of system. This system can also be used for doing travel time/speed studies and video enforcement.

Application: This system may benefit any project with the exception of a short term or moving maintenance project since the system needs to be installed and taken down after use.

Dual Traffic Warning Light System

A solar powered dual traffic warning light system has been used extensively in the maritime industry. Employing a unique lens, it can project a brighter beam of light with a 6-watt bulb than standard light beacons, thus making it ideally suited for being solar powered. It is composed of two synchronized flashing yellow lights, solar power panels, and a bulb changer for each light and a battery. This system is ideal for directing attention to traffic warning signs, year-round, 24 hours a day, at locations where access to conventional power is expensive or undesirable.

Cost Estimate: Like the Unilight the equipment is not expensive. Setting up a test deploy-ment at a work zone would probably cost upwards of $5k, which would include where and how to use it and supportive training, etc.

Issues: If used in Western Washington the system will need to be able to operate during winter months when solar energy is low.

Application. Any project where beacons can be used to support construction signing.

IDEAS THAT HAVE BEEN TRIED BUT NEED IMPROVEMENT

These have seen limited use within Washington and hold promise but more experience is needed with them to evaluate their benefits.

Modular Variable Message Sign

The modular variable message sign accommodates virtually any size of sign, across the widest variety of applications. Display modules can be arranged vertically or horizontally to create any length and width of sign desired in just minutes. Power is supplied by 12-volt

DC battery power or solar power. The entire configuration connects electronically to a master controller, which can receive message input from a hand-held controller or laptop computer.

Solar Portable Traffic Signal

The PTS 2000 is a solar-powered; dual-trailer mounted portable traffic signal system designed for high-visibility signaling in applications ranging from work zones and bridge repair to social events and emergency backup. This system provides energy efficient solar power, reliable radio-link communications, and ease of setup, operation and transport.

Wide Area Video Vehicle Detection System

Video detection systems have an image processor — a box that contains the microprocessor-based CPU, specialized image processing boards and software to analyze video images. This permits the collection of traffic data in construction zones where loops or other detection devices would be disabled due to roadside and pavement work. The data can be collected remotely or sent to any location for monitoring. The processor fits in a portable outdoor traffic cabinet and accepts video input from multiple roadside video cameras. The cameras are temporarily mounted on any pole within the workzone and can be quickly moved.

Solar Variable Message Signs

This is a portable three line, eight character per line changeable message sign consisting of L.E.D. (Light Emitting Diode) lamp matrix panels using patented optical assemblies that emit bright, distinctive messages to the traveling public. The Solar Message Center is powered by batteries, which are recharged by solar panels to provide long-lasting service on the roadway. This sign combines the benefits of no diesel power needed, no fuel or engine maintenance required, and an energy system that is capable of operating independently for 30 days with 3 hours of good sun required for each additional day of operation. The sign has a full matrix complete graphics capabilities and various combinations of lines and letter sizes.

Others Items

ITS Items
- Vehicle Intrusion Alarm for errant vehicles entering workzone.
Non-ITS Items
- Salt Spreader Truck-Mounted Attenuator (TMA).
- Portable Rumble Strip to delineate workzone.
- Direction Indicator Barricade for better guidance through workzones, particularly at night.
- Opposing Traffic Lane Divider for better traffic flow through workzones (will be tested this year)
- All-Terrain Sign stand to permit better temporary sign placement for workzones.

EQUIPMENT AUTOMATION

A great deal of effort is underway to improve the operations and safety of maintenance equipment. All of following applications have been developed to the point they have seen limited field-testing or deployment in California by Caltrans. Each could prove very useful

in Washington and should be investigated further.

- Advanced Snowplow (lane following, obstacle avoidance, integrated controls, etc.)
- The Automated Highway Systems Infrastructure Diagnostic Vehicle
- Automated Crack Sealing Machine
- Automated Litter Bag/Debris Collection Vehicle
- Automated Machine for Cone Placement and Retrieval
- Laser Removal of Graffiti
- Laser-Guided Lane Striping System
- Longitudinal Crack Sealing Machine
- Robotic System for Roadway Stenciling
- Smart Herbicide Applicator
- Teleoperated and Automated Maintenance Equipment Robotics (will be tested this year in Wenatchee)
- Teleoperated Hazmat Vehicle

Additional advance snowplow testing is underway in Minnesota, Iowa, and Michigan.